

WET WELL MOUNTED PUMP STATION PREPURCHASE

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide a complete, tested, and operating wet well mounted pump station with two vertical, close-coupled, motor driven, vacuum primed, non-clog pumps; valves, internal piping; vacuum pump and valve control panel with motor starters and overloads plus auxiliaries; heater; ventilating blower; priming pumps with sonic pump prime detection system and appurtenances; and all internal wiring as shown on the Drawings and as specified herein. Equipment is being procured by the Owner under a pre-purchase contract and will be supplied to a contractor as owner-furnished equipment.
- B. A PLC-based site control will be provided by others.
- C. Reference drawings are provided as Attachment 1.

1.02 REFERENCES

- A. ASTM International (ASTM):
 - 1. A743 Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion-Resistant, for General Application.
 - 2. A36 Standard Specification or Carbon Structural Steel
- B. Anti-Friction Bearing Manufacturers Association (AFBMA).
- C. Hydraulic Institute.
- D. American Welding Society.

1.03 SUBMITTAL PROCEDURES

- A. Accompany submittal with a City of Port Angeles Submittal form (DOT Form 350-071 Request for Approval of Material), which contains the following information:
 - 1. Supplier's name
 - 2. The project name and identifying number.
 - 3. Description of the submittal and reference to the Contract requirement or technical specification paragraph number being addressed.
- B. Provide one electronic copy of the submittals described herein to the Owner and Engineer in Adobe Acrobat PDF format.
- C. Content of Submittals:
 - 1. Each submittal shall include all items and material required for a complete assembly of the pump station.
 - 2. Submittals shall contain all physical, technical, and performance data necessary to demonstrate conclusively that the items comply with the requirements of the Contract Documents.

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3. Include information on characteristics of electrical or utility service required and verification that requirements have been coordinated with services provided by the Work and by other interconnected elements of the Work.
 4. Provide verification that the physical characteristics of items submitted, including size, configuration, clearances, mounting points, utility connection points, and service access points, are suitable for the space provided and are compatible with other interrelated items that are existing or have or will be submitted.
 5. Label each Product Data Submittal, and Shop Drawing with the information required in paragraph 1.03A. Highlight or mark every page of every copy of all Product Data submittals to show the specific items being submitted and all options included, or choices offered.
 6. Designation of work as "NIC" or "by others," shown on Shop Drawings, shall mean that the work will be the responsibility of others rather than the supplier who has prepared the Shop Drawings.
- D. Submittals that contain deviations from the requirements of the Contract Documents shall be accompanied by a separate letter explaining the deviations. The Engineer's favorable review of the submittal shall not relieve the Contractor from responsibility for deviations from the Contract Document requirements unless the deviations are specifically called to the Engineer's attention in a separate letter and the Engineer favorably reviews the deviation in writing. The Supplier's letter shall:
1. Cite the specific Contract requirement including the paragraph number for which approval of a deviation is sought.
 2. Describe the proposed alternate material, item, or construction and explain its advantages and/or disadvantages to the Owner.
 3. State the reduction in Contract Price if any that is offered to the Owner.
- E. Engineer's Review Procedure and Meaning:
1. The Engineer will stamp and mark each Product Review submittal prior to returning it to the Supplier. The stamp will indicate whether or not the review was favorable and what action is required of the Supplier. Review categories "No Exceptions Taken" and "Make Corrections Noted" both indicate Favorable Review.
 2. The Engineer's Favorable Review is contingent on the Supplier's warranties. Favorable Review is also contingent on:
 - a. The compatibility of items included in a submittal with other related or interdependent items included in previous or future submittals.
 - b. Future submittal of items related to or required to be part of this submittal that were not included with this submittal.
 3. Favorable Review of a submittal does not constitute approval or deletion of items required as part of the submittal but not included with the submittal. Favorable Review of items included in the submittal does not constitute deletion of specified features, options or accessories that were not included in the submittal.

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4. The action required by the Supplier for each category of review is as follows:
 - a. NO EXCEPTIONS TAKEN. NO RESUBMITTAL REQUIRED.
 - b. MAKE CORRECTIONS NOTED:
 - 1) NO RESUBMITTAL REQUIRED. The Supplier shall make corrections noted prior to manufacture.
 - 2) PARTIAL RESUBMITTALS REQUIRED. The Supplier shall submit related accessory or optional items as noted which are required but were not included with the submittal and/or shall resubmit unsatisfactory portions or attributes of items as noted. The Supplier may proceed to manufacture those portions of the submittal that will be unaffected by required resubmittals.
 - c. AMEND AND RESUBMIT. The Supplier shall amend and resubmit the submittal as noted or required to comply with the Contract Documents.
 - d. REJECTED - RESUBMIT. The item submitted does not comply with the Contract Documents in a major way. Resubmit items that comply with the requirements of the Contract Documents.
 5. The letter of transmittal accompanying the returned Product Review submittal may contain numbered notes. Marking a corresponding number on a Shop Drawing or Product Data submittal shall have the same affect as applying the entire note to the submittal.
- F. Re-submittals that contain changes that were not requested by the Engineer on the previous submittal shall be accompanied by a letter explaining the change. The Engineer's favorable review of a resubmittal does not include a review of changes made by the Supplier that were not requested by the Engineer unless the Supplier calls the Engineer's attention to the non-requested changes in a separate letter accompanying the submittal.
- G. Favorable Review Required Prior to Proceeding: Do not proceed with manufacture, fabrication, delivery, or installation of items prior to obtaining the Engineer's Favorable Review of Product Review submittals.
- H. Intent and Limitation on Engineer's Review:
1. The Supplier has primary responsibility for submitting and providing work that complies with the requirements of the Contract Documents. Neither the Engineer's Favorable Review nor the Engineer's failure to notice or comment on deficiencies in the Supplier submittals shall relieve the Supplier from the duty to provide work, which complies with the requirements of the Contract Documents.
 2. The Engineer's review of submittals is done solely for the Engineer's and Owner's benefit. The Engineer has no duty to the Supplier or any of its subcontractors or suppliers for the accuracy, completeness, or adequacy of the Engineer's review of submittals.
 3. The Engineer's review of submittals is for compliance with the design intent and requirements of the Contract Documents and is based solely

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on information provided by the Supplier and on the Supplier warranty that the work or items submitted meet the requirements of the Contract Documents, and the Work as a whole. If later information reveals that work or items submitted or furnished do not meet the requirements of the Contract Documents or the Work as a whole, the Engineer's Favorable Review shall be void and the items of work shall be considered defective.

4. The Engineer's Favorable Review shall not include an examination of methods or means of construction or required safety precautions.
5. The Engineer's Favorable Review: (1) shall not include a review of quantities or dimensions, (2) shall not relieve the Supplier from responsibility for errors or omissions in submittals, (3) shall not relieve the Contractor from responsibility for complying with the requirements of the Contract Documents, (4) shall not constitute a Change Order, and (5) shall not constitute final acceptance of a product, item or portion of the Work.

1.04 SHOP DRAWING and PRODUCT DATA SUBMITTED FOR PRODUCT REVIEW

- A. Shop Drawings: Submit shop drawings for favorable review of the wet well mounted pump station and included accessories. Include sufficient data to show that equipment conforms to Specification requirements as indicated herein. Include the following:
 1. Pump and motor product and performance data, including a prototype pump performance curve for each application and indicate minimum continuous stable flow (MCSF). Indicate impeller trim. Submit certification that pumps and motors are suitable for adjustable speed service. Submit adjustable speed performance curves covering the range from full speed to manufacturer's recommended minimum speed. Indicate minimum continuous stable flow (MCSF) for all speeds.
 2. Seismic anchorage design, certification, and related sketch shall be provided by the installation contractor.
 3. Pump layouts and dimensions. Measurements shall be incorporated into the initial pump station submittal.
 4. Pump performance curves.
 5. Bearing life calculations.
- B. Performance Testing: Certified non-witnessed factory performance tests in accordance with Hydraulics Institute Standard 14.6 are required for each pump and shall be not less than Grade 1U unless noted elsewhere in this specification. Obtain favorable review from the Engineer prior to shipment of the pump station.
 1. All components of the pump station shall be given an operational test at the pump station manufacture's facility to check for excessive vibration or leaks in the piping or seals, and to correct operation of the automatic control and, vacuum priming systems and all auxiliary

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- equipment. Installed pumps shall take suction from a deep wet well, simulating actual service conditions.
2. Factory test instrumentation must include flow measuring with indicator; compound suction gauge; Bourdon tube-type discharge pressure gauge; electrical meters to measure amperes, volts, kilowatts and power factor; speed indicator; and a vibrometer capable of measuring both amplitude and frequency
- C. Manuals:
1. Furnish manufacturer's installation, lubrication, operation and maintenance manuals, bulletins, and spare parts lists.
 2. An instructional video presentation on the pump mechanical seal system in DVD format shall be included. The DVD shall contain a presentation on the following subjects: purpose and location of the mechanical seal, signs of a defective mechanical seal, how to remove the mechanical seal, troubleshooting seal failure causes, seal components, required tools, how to reinstall the seal, and how to place the pump back into service. The video shall include footage of an actual seal replacement.
 3. Electronic O&M Manual. Provide one electronic copy of all portions of the manual in Adobe Acrobat PDF format on disks appropriately labeled and numbered in sequence. Bookmark the file to identify items per manual's Table of Contents. Provide an additional copy of the drawing portion of the manual in AutoCAD format, appropriately labeled and numbered in sequence, along with a text file (*.txt) giving the pen assignments to be used in plotting.
- D. Affidavits: Submit affidavit from the manufacturer stating that the equipment has been properly installed, adjusted, and tested and is ready for full time operation.

1.05 QUALITY ASSURANCE

- A. All equipment furnished shall: 1) be of a manufacturer who has been regularly engaged in the design and manufacture of the equipment for at least 5 years; and 2) be demonstrated to the satisfaction of the Engineer that the quality is equal to equipment made by those manufacturers specifically named herein.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Pump Station: Smith and Loveless; or approved equal.

2.02 PERFORMANCE AND DESIGN REQUIREMENTS

- A. Pump Schedule:

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Item	Name of Pump(s)
Quantity of Pumps	2 pumps / 1 Pump Station
Liquid Being Pumped	Domestic Wastewater
Pump Type	Centrifugal/End Suction
Pump Configuration	Vacuum Primed/Suction-Lift
Maximum Suction Lift	20 ft.
Primary Point at Full Speed	1,180 GPM @ 40 ft. TDH
Future Point at Full Speed (only to be achieved by replacement of impeller)	1,520 GPM @ 64 ft. TDH
Maximum Capacity at Full Speed	1,725 GPM @ 32 ft. TDH ±5 ft.
Minimum Capacity at full speed	500 GPM @ 50 ft. TDH ±5 ft.
Maximum NPSH Required @ Maximum Capacity	8 ft.
Minimum Speed	900 RPM
Maximum Speed	1,170 RPM
Motor Horsepower	40 HP
Manufacturer/Model	Smith and Loveless/8D4D or approved equal
Impeller Size	12 1/8 inches
Future Impeller Size	14 inches
Minimum Size (Suct. x Disch.)	8-inch x 8-inch
Minimum Guaranteed Efficiency @ Primary Point	63%
Compound Pressure Gauge Range:	0 to -14.7 psi (vacuum) 0 to 60 psi (pressure)

- B. Wet well mounted (suction-lift) pump station shall operate without excessive noise or vibration over the full operating range indicated in the pump schedule. Vibration shall meet Hydraulic Institute standards.
- C. Actual tested horsepower of each pump, with final impeller trim, shall not exceed motor nameplate horsepower at any point on the pump curve.

2.03 EQUIPMENT

- A. Provide a wet well mounted pump station constructed in one complete, factory-built assembly fabricated for installation atop existing wet well as shown in the reference drawings provided as Attachment 1.
 - 1. Pump station shall be enclosed by a two-piece hinged fiberglass cover. The cover shall have a suitable drip-lip around the edge and shall be provided with means to allow the pump chamber to be locked with a padlock.

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2. Each cover half shall be attached with a multi segment stainless steel hinge, constructed of minimum 7-gauge type 304 stainless steel with a 3/8-inch diameter stainless steel pin and supporting at least 75% of the width of one end. Stainless steel bolts with tamperproof heads and a full width 3/8-inch thick anodized aluminum backing plate shall anchor the hinge to the fiberglass cover.
 3. Dual high-pressure gas struts shall be provided to counteract the dead weight of each cover assembly and limit the maximum lifting force required for opening to less than 20 pounds. The cover shall be self-latching upon opening, with a manually operating release for closing. Duplex heavy gauge safety chains shall be provided to prevent over-extension. All hardware and components of the cover assembly that are exposed to the weather shall be constructed of corrosion resistant materials.
 4. The enclosure utilized to house the valve train and controls defined under OSHA Article 29CFR, Part 1910 shall not be identified as a confined space.
- B. Provide an aluminum manway cover, located exterior to the fiberglass pump chamber.
1. Provide a two-piece manway cover of 1/4-inch aluminum treadplate, with stainless steel piano hinges and hardware, located exterior to the fiberglass pump chamber, complete with padlocking provisions.
 - a. Two-piece manway shall be required to facilitate visual checking of the float switch settings.
 2. The manway shall provide access to the wet well. The minimum open area of the manway access into the wet well shall be at least 4.2 square feet.
 3. The manway cover shall have a three-color, 7 inches by 10 inches (minimum) corrosion-resistant, sign permanently affixed to it, reading "DANGER – Before Entering, Test for Explosive Atmosphere. Test for Oxygen Deficiency. Supply Fresh Air to work Area."
 4. The manway shall be constructed in such a manner as to prevent combustible vapors from the wet well from entering the enclosure.
- C. Provide carbon steel baseplate.
1. The supporting floor plate shall be a minimum 1-inch thick carbon steel with reinforcing, to prevent deflection and provide rigid support. Steel plate shall meet or exceed ASTM A-36 specifications.
- D. Provide two (2) 8-inch diameter vertical, centrifugal non-clog type of heavy cast-iron construction pumps, especially designed for the use of mechanical seals and vacuum priming as indicated in the pump schedule.
1. Shaft bearing nearest the pump impeller shall be locked in place so that end play is limited to the clearance within the bearing to minimize wear caused by linear movement of the shaft.
 - a. Bearing shall be designed for the combined thrust and radial load.

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- b. Upper bearing shall be free to move in a linear direction with the thermal expansion of the shaft and shall carry only radial loads.
 2. The shaft from the top of the impeller to the lower bearing supporting the impeller shall have a minimum diameter as specified by the manufacturer to minimize seal wear resulting from shaft deflection caused by the radial thrust of the pump.
 - a. The motor shaft shall be directly connected to the impeller without the use of drive belts or couplings.
 - b. Shaft shall be solid stainless steel through the mechanical seal. Removeable shaft sleeves will not be acceptable if the shaft under the sleeve does not meet the specified minimum diameter.
 3. The dimension from the lowest bearing to the top of the impeller shall not exceed 6-inch.
 4. Pumps shall have an integral adapter providing a large water reservoir above the impeller to provide for positive exclusion of air from the impeller. The seal shall be inside this area to assure lubrication.
 5. The pump volute shall be furnished with fronthead mounting adapters, bolted to the station floor for rigidity, and gasketed for a gas-tight seal.
- E. Impeller: Enclosed two-port type, made of close-grained cast-iron, statically and dynamically balanced. The eye of the impeller as well as the ports shall be large enough to pass a 3-inch sphere. Secure against rotation on the shaft by means of a key and capscrew equipped with a self-locking device. The first critical shaft speed shall be at least 125% of full operating speed.
- F. Bearings: Oversized, heavy-duty, grease lubricated ball-bearing or roller bearing type.
- G. Pump Seal: Seal shall be of carbon and ceramic materials with the mating surfaces lapped to a flatness tolerance of one light band. Pumps shall have single mechanical shaft seals with ceramic or Ni Resist stationary seat, carbon washer, BUNA elastomer, and stainless-steel housing parts and springs.
- H. Motor: Provide motors suitable for operation at 480 volts and conforming to requirements below.
 1. Motors shall be installed vertically, and include a solid shaft, NEMA P-base, squirrel-cage induction-type with class F insulation.
 2. Motors shall have a service factor of 1.15. Nameplate motor horsepower shall not be exceeded at any flow up through the maximum operating point in the Pump Schedule.
 3. The motor-pump shaft shall be centered on the motor based within a tolerance of +/- 0.005". Shaft runout shall not exceed 0.003"
 4. Motors shall be suitable for operation with a variable frequency drive over the specified operating range of the pumps.
 5. Motors shall be Premium Efficiency type, per NEMA MG-1 table 12-12, Inverter Ready per NEMA Part 31.4.4.2, with cast-iron frames.
 6. Motor windings shall be 200 C Inverter Spike-Resistance magnet wire and motors shall have an epoxy coating.

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7. Motor lead length shall be sized accordingly and provided with sufficient length to disconnect immediately outside the enclosure as shown in the drawings provided in Attachment 1. The motor lead shall be provided with a Meltric disconnect plug.
- I. Vacuum Priming System: A vacuum-priming system shall be provided to prime the main pumps
 1. The system shall include two vacuum pumps, providing 100 percent standby, and have corrosion resistant internals.
 2. The system shall have large port vacuum control solenoid valves, Sonic Start, or equal, prime level sensor, float-operated check valves and shut-off valves.
 - a. Float operated check valves shall have a transparent body
 - b. Solenoid valves shall be high flow, direct acting brass body type, with threaded ports, NBR seals and 300 Series stainless-steel plunger, rod, plate and springs. Minimum orifice diameter shall be 5/16-inch.
 3. All hoses and tubing shall be at least 3/8-inch nominal diameter.
 4. Air discharged from vacuum pump shall be piped into the wet well.
 5. The vacuum pumps shall be mounted on adjustable extruded aluminum slotted rail supports and shall be operated through finger safe relays with a "push-to-operate" manual override feature.
 6. Liquid level in the pump priming chamber shall be monitored by a sonic resonant frequency liquid level probe. The probe shall be equipped with a piezoelectric drive and sensitive circuits. Probe shall be sealed by 316L stainless-steel housing. Sonic probe shall have emitting diodes for diagnostics of connectivity, prime status or fault condition.
 7. The system shall provide positive lubrication of the mechanical seal each time the main pump is primed.
 8. The vacuum priming system shall have two field selectable modes of operation. In the "On-Demand" mode, the priming system will operate only after a pump is called on to run, and if it is not primed. Once primed, the pump will be allowed to run. In the "Constant Prime" mode, both pumps are kept primed continuously, and ready to start immediately when called for.
- J. Ventilation Blower: Provide a ventilation blower capable ventilating the space at no less than 6 air exchanges per hour in accordance with NFPA 820.
 1. The ventilating blower shall be turned On and Off automatically by the vendor control panel. Relays shall be provided to allow for control of temperature settings which operate the blower by the main control panel. A heavy extruded aluminum louvered grille with adjustable openings shall cover the discharge of the blower. A similar grille shall be provided in the other end of the station enclosure for air intake.

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- K. Heater: Provide a 500-watt electric heater controlled by the vendor control panel.
 - 1. Relays shall be provided to allow for control of temperature settings which operate the heater by the main control panel. The heater shall be rigidly mounted in the station to prevent removal.

- L. Electrical: The vacuum priming system and environmental equipment shall be controlled by the vendor control panel. Electrical connections and instrumentation and control input/outputs required to route alarm and other signals required to operate these systems shall be provided to allow for communication with the main control panel provided by others.
 - 1. The control equipment shall be mounted in a NEMA Type 4 steel enclosure with two hinged, lockable doors that shall house the single-phase control circuits and low voltage components.
 - 2. The vendor control panel shall be operable without opening the enclosure door.
 - 3. The control panel shall be supported on adjustable, extruded aluminum mounting legs, secured to the station baseplate. The slotted legs shall also serve as mounting points for auxiliary items, such as the vacuum priming subassembly.
 - 4. All components within the control panel shall be UL listed or recognized, and the complete vendor control panel itself shall be labeled as a UL 508A General Use Industrial Control Panel. The electrical equipment in the panel shall be protected by a surge protective device.
 - 5. To facilitate wire tracing and servicing, the control wiring shall be run in enclosed wireways, with removable covers, rather than tied up in bundles.
 - 6. Control relays up to 6-amp capacity shall be the modular, plug-in type, with integral LED indicating lights to show activation. Larger control relays and vacuum pump contactors shall be enclosed to be "finger safe".
 - 7. A duplex GFI protected convenience outlet shall be provided in the station for operation of 120-volt AC devices.
 - 8. Thermal magnetic air circuit breakers shall be provided for branch disconnect service and short-circuit protection of all auxiliary circuits, and motor circuit protectors with lockout capability shall be provided for each pump motor. Only instantaneous trip magnetic type motor circuit protectors, matched to the motor inrush current, shall be used for the motor circuits, for added protection from low-level faults. Thermal magnetic circuit breakers will not be allowed for pump motor service.
 - 9. Magnetic across-the-line starters with 24-volt coils and solid-state overload protection for each phase shall be provided for each pump motor to give positive protection against phase unbalance, thermal overload, phase loss and ground fault. To provide the fastest trip speed and for ground fault protection, only solid-state overload protection will be used, and motor starters using heater coils will not be

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acceptable. Each single-phase auxiliary motor shall be equipped with an over-current protection device in addition to the branch circuit breaker or shall be impedance protected. All wiring shall be labeled with thermal transfer self-laminating labels and a coded wiring diagram shall be provided.

10. A thermostat shall be provided to monitor the ambient temperature in the pump station, and to control the operation of the 500-watt station heater.
 11. Pump Failure to Prime or Failure to Pump Alarm: To sense failure to deliver normal flow for any reason, including failure to prime, each pump shall be provided with a sealed sensor switch mounted in a protective ABS enclosure.
 - a. The enclosure shall be mounted with an adjustable universal mounting bracket to the external arm of each discharge check valve. The mounting bracket shall allow the adjustment of the sensor switch with a single locking pivot adjustment.
 - b. A red LED indicating light shall be provided on each switch unit to facilitate accurate setting of the switch for proper operation. The sensor switch shall monitor the movement of the check valve arm and thereby detect failure of the pump to deliver normal operating flow when called on to run.
- M. Provide main suction and discharge piping connections:
1. Pump suction connections shall be drilled and tapped for ANSI 125 flanged connections.
 2. Pump discharge lines shall be fitted with clapper-style check valve and eccentric plug valves.
 - a. Check valve shall be spring-loaded type with external level arm, resilient seat, stainless-steel shaft and replaceable bronze shaft bushings.
 3. Station floor penetrations shall be sealed by gaskets.
 4. Pump station shall be provided with compression-type sleeve coupling for installation of common discharge pipe.
- N. Pressure Gauges
1. Provide 4-inch Bourdon tube-type compound vacuum/pressure gauge with 3-1/2-inch dial, fitted with a brass stop valve and a manual air relief valve shall be provided for each pump.
 2. The gauges shall be mounted apart from the pumps, on a bracket attached to the control panel support structure and connected to the pump discharge taps by flexible tubing to minimize vibration. Gages shall be provided with means of flushing the tubing with additional tubing routed to the nearest station drain.
 3. The range of each gauge shall be as shown on the Pump Schedule.
 4. The dial shall be white with black markings and the gauge itself shall have an accuracy of 1% of scale.

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5. The gauge shall be American made, with a Zytel Nylon case with ½-inch (13 mm) blow-out plug, stainless steel bezel, acrylic lens and phosphorus bronze tube with brass socket.
6. Temperature compensation shall be provided by an internal compensating diaphragm.
7. Gauges shall be protected from the service fluid by a Buna-N elastomer “boot” diaphragm within the stem, and the Bourdon tube and the space between the Bourdon tube and the internal isolating diaphragm shall be filled with low temperature instrument oil, completely isolating the gauge components from the fluid being measured.

2.04 FINISHES

- A. Provide pumps, motors, and bases with the manufacturer's standard factory-applied paint finish except as noted.
- B. All structural steel surfaces shall be factory blasted with steel grit, in an environmentally controlled booth, to remove rust, mill scale, weld slag, etc. All weld spatter and surface roughness shall be removed by grinding. Surface preparation shall comply with SSPC-SP6 specifications. Sandblasting is specifically prohibited.
- C. Immediately following cleaning, apply a single 6-8 mil (0.15-0.20 mm) dry film thickness coating of self-priming Cycloaliphatic Amine Epoxy, Versapox or equal shall be factory applied to the base.
- D. After curing, a 2-3 mil (0.05-0.08 mm) dry film thickness top coating of moisture-cured Aliphatic Polyurethane protective finish, Xtrathane, or equal, shall be applied to the top and underside of the base.
- E. Stainless steel, aluminum and other corrosion-resistant surfaces shall not be coated. Carbon steel surfaces not otherwise protected shall be coated with a suitable non-hardening rust preventative compound. Auxiliary components such as the electrical enclosure, ventilating blower and vacuum pumps shall be furnished with the original manufacturer's coating.
- F. Finish coating shall be accomplished prior to shipment of the station from the factory and shall comply fully with the intent of these specifications. A touch-up kit shall be provided by the pump station manufacturer for repair of any mars or scratches occurring during shipping and installation. This kit shall contain detailed instructions for use.

2.05 Spare parts

- A. A complete replacement pump shaft seal assembly shall be furnished with each pump station. The spare seal shall be packed in a suitable container and shall include complete installation instructions. A spare volute gasket and seal gasket shall be provided. A spare mechanical seal shall be provided

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- B. Any special tool required to install spare parts shall be provided.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Equipment to be installed by Contractor selected by the City in strict conformance with manufacturer's installation instructions. Supplier shall assist and communicate with Contractor on delivery and installation of the equipment.

3.02 FIELD SERVICE

- A. The equipment manufacturer shall supply a competent field service engineer to thoroughly check and inspect the equipment after installation, place the equipment in operation, make necessary adjustments, calibrate instruments, conduct field tests, and instruct owner's operating personnel in the operation and maintenance of the equipment.

END OF SPECIFICATION